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Fertility Transition in Kenya

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FERTILITY TRANSITION IN KENYA

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1 INTRODUCTION AND OBJECTIVES

Various Kenyan surveys and censuses reveal that birth rates increased between 1948 and 1977-1978 but declined thereafter. The Total Fertility Rate (TFR) which was estimated at about 8.2 in the 1977-1978 Kenya Fertility Survey (KFS) dropped slightly to 7.7 in the 1984 Kenya Contraceptive Prevalence Survey (KCPS) and to 6.7 in the 1989 Kenya Demographic and Health Survey (KDHS) (NCPD and IRD, 1989). Though reproductive levels are still very high, the magnitude of the reduction (20 percent) indicates that Kenya may have entered a long-term process of fertility decline.

The understanding of the components of the fertility decline is important for policy and research purposes. It is particularly essential for Kenyan policymakers to know why fertility rates have started declining after many decades where the country has maintained one of the highest fertility rates in sub-Saharan Africa and why past efforts to reduce fertility rates were not successful.

In order to provide a better understanding of the components of fertility change, many demographers have used the proximate determinants framework. The focus on this framework is appropriate because the proximate determinants are the only factors that directly influence, and therefore determine, fertility levels and change (Bongaarts, 1978; Davis and Blake, 1956). Consequently, changes in one or more of the proximate determinants should have repercussions on fertility, assuming that the other variables remain constant.

Studies that used this framework show that increased use of modern contraception is largely responsible for fertility declines observed in many developing countries (Berelson et al., 1980; Bongaarts, 1986; DaVanzo and Haaga, 1982; Lapham and Mauldin, 1985). Thus it would be reasonable to attribute at least part of the recent fertility decline in Kenya to the observed increase in contraceptive use. Fertility declines in some developing countries have also been partially attributed to shifts in other proximate determinants—mostly changes in marriage and breastfeeding patterns.

This study adopts the proximate determinants framework to examine fertility change in Kenya. Three objectives are pursued. The first one is to describe fertility levels and trends at the aggregate and subgroup level, classified by level of education and type and region of residence. The second objective is to document trends in the proximate determinants of fertility (breastfeeding, contraceptive use, marital patterns, postpartum infecundability, and sterility). The third objective is to examine the relative role of the various determinants to the fertility decline. Specifically, the Bongaarts' model (Bongaarts, 1978 and Bongaarts and Potter, 1983) is employed to decompose the fertility decline into parts due to changes in each determinant.

This research goes beyond many previous studies that have used the Bongaarts' model to study fertility in Kenya because it uses two nationally representative data sets to examine the determinants of fertility levels and trends. Most previous studies (with the exception of Harbison and Robinson, 1990) have relied on one cross-sectional data set (the 1977-1978 KFS). However, unlike Harbison and Robinson (1990), our study extends the analysis to various population subgroups.

2 DATA

This study uses data from the 1977-1978 Kenya Fertility Survey (KFS) and the 1989 Kenya Demographic and Health Survey (KDHS). Both surveys obtained detailed data on large scientifically selected samples of women covering 95 percent of the population in all areas except the North-Eastern Province and four sparsely populated districts.[1] The KFS and the KDHS are sufficiently similar to permit the construction of comparable variables which can be used to study changes and determinants of fertility between the two surveys. First, both surveys are representative samples of women of reproductive age. Indeed, this was the objective of the sample designs used in the surveys. The interviewing procedures were also similar. Finally, the women's questionnaires employed in both surveys include a comprehensive birth history with comparable questions on breastfeeding, abstinence, amenorrhoea, and contraception. Other comparable current status data include age in completed years, marital status, parity, and other socio-economic background variables such as education of mother, region, and type of current residence.

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[1] These districts were Marsabit and Isiolo in Eastern Province and Samburu and Turkana in the Rift Valley Province.

3 ANALYTICAL FRAMEWORK

The proximate determinants framework is employed to assess the relative contribution of contraception, marriage, sterility, and breastfeeding on fertility levels and change in Kenya. The proximate determinants are so referred because they are the only variables that have a direct impact on fertility (Bongaarts, 1978; Davis and Blake, 1956). Social and economic factors, such as education, type of current residence, and religion (the "indirect determinants") affect fertility only through the proximate determinants.

The quantitative model developed by Bongaarts is applied in this paper to study the components of fertility change in Kenya. This model uses a series of indices ranging between 0 and 1 to measure the fertility-inhibiting effects of marriage patterns, contraception, sterility,[2] induced abortion, and postpartum infecundability. The theoretically possible values for each index range from 0 to 1. A value of 0 indicates total suppression of fertility by the variable concerned, while 1 implies that the variable has no fertility inhibition. The model can be expressed as follows:

$$TFR = TF * Cm * Cc * Ci * Ca * Cp$$

Each of these indices is derived by separate equations.

TFR is the observed total fertility rate. This study computes TFRs for 4-year periods (0-3) prior to each survey to avoid displacement of births (Arnold, 1990).

TF is the total fecundity rate or the level of fertility one would expect if all women were married throughout their whole reproductive life, if there was no contraceptive use or abortion, and if the postpartum period was not extended by lactation and abstinence. The TF values for most populations range between 13 and 17 births per woman, with an average of about 15.3 births. Lower values are found in exceptional circumstances--for example, areas with a high prevalence of sterility and/or prolonged separation of spouses.

Cm is the index of marriage. In the original formulation of the model, the index of marriage reflected the relative loss of potential fertility due to the fact that most women are not continuously married between the ages of 15 to 50 years (Bongaarts, 1978). This idea was based on the assumption that exposure to intercourse is confined within marriage. However, this study recognises that premarital and extramarital births are not negligible in the country (Njogu and Castro-Martin, 1991). The Cm index is therefore a measure of all exposure (marital and nonmarital). The Cm index is computed as the

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[2] The original Bongaarts model did not include the index of sterility because it was not considered an important intermediate variable. However, studies by Frank (1984, 1985, and 1987) and Mosley et al. (1982) showed that sterility contributes significantly to fertility variations in many African countries.

ratio of the observed TFR to the observed total marital fertility rate (Bongaarts, 1984). In this case, Cm is a measure of all exposure.

Cc is the index of noncontraception. Cc=1-1.08ue, where "u" is the proportion of currently married contracepting women and e=effectiveness of modern and traditional methods taken separately. The effectiveness of modern methods is e=0.9 and e=0.5 for traditional methods. Thus, Cc equals 1-1.08(0.9um+0.5ut),where m,u represent modern and traditional methods, respectively.

Ca is the index of abortion. This index is assumed to be 1.0 because we do not have any data on abortion.

Ci is the index of postpartum infecundability. This index reflects the loss of potential fertility due to the extension of the postpartum nonsusceptible period by lactation-related amenorrhoea and abstinence. Ci is estimated as Ci=20/18.5+i, where "i" is the mean duration of postpartum infecundability. The mean duration of postpartum infecundability is defined as prevalence (average number of children whose mothers were either amenorrhoeic or abstaining at time of survey) divided by the incidence (average number of births per month over the last 36 months).

Cp is the index of sterility. It is estimated from the percentage childless, "S," among women at the end of reproductive years, using the equation, Cp=(7.63-0.11 x S)/7.30 (Bongaarts et al., 1984). This study uses data on all women who were 40 years or more at the time of survey.

The model presented earlier has been extended to decompose fertility change between two time periods as follows:

$$Pf = Pm + Pc + Pa + Pi + Pp + Pr + I$$

where the **P** values represent proportional change in the TFR due to change in marriage patterns (Pm), contraception (Pc), abortion (Pa), postpartum infecundability (Pi), sterility (Pp), other proximate determinants (Pr), and the **I** component is an interaction term (Bongaarts and Potter, 1983). The **P** values are computed from the indices of the proximate determinants of fertility as follows:

Pf = $(TFR_{89}/TFR_{77)}$ - 1: proportional change in TFR between 1977-1978 and 1989.

Pm = $(Cm_{89}/Cm_{77)}$ - 1: proportional change in TFR due to change in the index of marriage.

Pc = $(Cc_{89}/Cc_{77)}$ - 1: proportional change in TFR due to change in the index of contraception.

$Pa = (Ca_{89}/Ca_{77)} - 1$: proportional change in TFR due to change in the index of abortion.

$Pi = (Ci_{89}/Ci_{77)} - 1$: proportional change in TFR due to change in the index of postpartum infecundability.

$Pp = (Cp_{89}/Cp_{77)} - 1$: proportional change in TFR due to change in the index of sterility.

$Pr = (Cr_{89}/Cr_{77)} - 1$: proportional change due to changes in the remaining proximate variables—natural fecundability, spontaneous intra-uterine mortality.

The Bongaarts model has been used with Kenyan data with varying success. Ferry and Page (1984) applied the model to the 1977-78 KFS data. Their study revealed that lactational amenorrhoea was the main fertility-inhibiting factor, followed by marriage patterns, whereas non-marriage contraception had a minor impact on fertility. The impact of marriage on fertility was, however, restricted to the youngest women. They concluded that postponement of marriage has a greater influence on fertility than non-marriage or marital dissolution.

Kalule-Sabiti (1984) used the model with the 1977-1978 KFS data. The model was found to fit well for all but women in Nairobi and Coast Provinces and among Muslim and Mijikenda ethnic groups, where model fertility estimates were higher than the observed rates. The higher than expected fertility rates were attributed to induced abortion, secondary sterility, and/or unreported contraceptive use. The study also found that education and urbanisation have offsetting effects on fertility—by reducing lactation (which increases fertility) and increasing contraceptive use (which reduces fertility).

Mosley et al. (1982) demonstrated how social and cultural factors operate on the intermediate variables, producing major differentials in marital fertility. Modernisation was shown to result in higher fertility, because of its downward effect on breastfeeding, postpartum abstinence, and polygamy. They also showed that fertility differentials in Kenya are mainly due to the effects of marriage and fecundity.

More recently, Harbison and Robinson (1990) have used the Bongaarts model to study the components of fertility decline in Kenya. Using the most recent data (the 1977-1978 KFS, the 1984 KCPS, and the 1989 KDHS), they show that deliberate birth prevention measures—contraception and abortion[3]—account for about half of the reduction in fertility in Kenya. They argue that the changing attitudes toward contraception have resulted from increased costs of raising children.

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[3] Although data on abortion is lacking, Harbison and Robinson make some assumptions about national incidence of abortion from clinic and community-based studies.

4 FINDINGS

4.1 Fertility Decline

Presented in Table 4.1 are the total fertility rates for the 4-year period preceding the 1977-1978 KFS and the 1989 KDHS. These figures reveal a 20 percent fertility decline between the two surveys. The total fertility rate dropped from 8.2 children per woman to 6.6 children between 1977-1978 and 1989. Figure 4.1 indicates that fertility decline may have started as early as the late 1970s. The consistent but small declines observed over this period suggest that the onset of fertility transition may have started in Kenya.

Shown in Table 4.1 is the fact that all subgroups experienced some fertility decline, although the rate of the descent differed greatly. Fertility declines have been most rapid in urban areas, in Nairobi and Central Provinces and among the highly educated women. Fertility declines have been negligible in Western Province.

4.2 The Transition in the Proximate Determinants of Fertility

The data present in the previous section demonstrated that Kenya experienced a fertility decline between 1977-1978 and 1989. The next section examines trends in the proximate determinants of fertility.

4.3 Marital Patterns

The impact of marriage on fertility has long been recognised in demographic literature (Bumpass et al., 1978; Mosley et al., 1982). Marriage was the major check on fertility in pretransitional European populations. Marriage in these societies was an important determinant of fertility because it marked the beginning of sexual exposure and the total duration during which women were exposed to the risk of childbearing (Medick, 1981). The relationship between marriage and childbearing is, however, tenuous in sub-Saharan Africa because exposure to sexual intercourse and childbearing is not restricted to marriage (Ferry and Page, 1984). Under these conditions, changes in marital

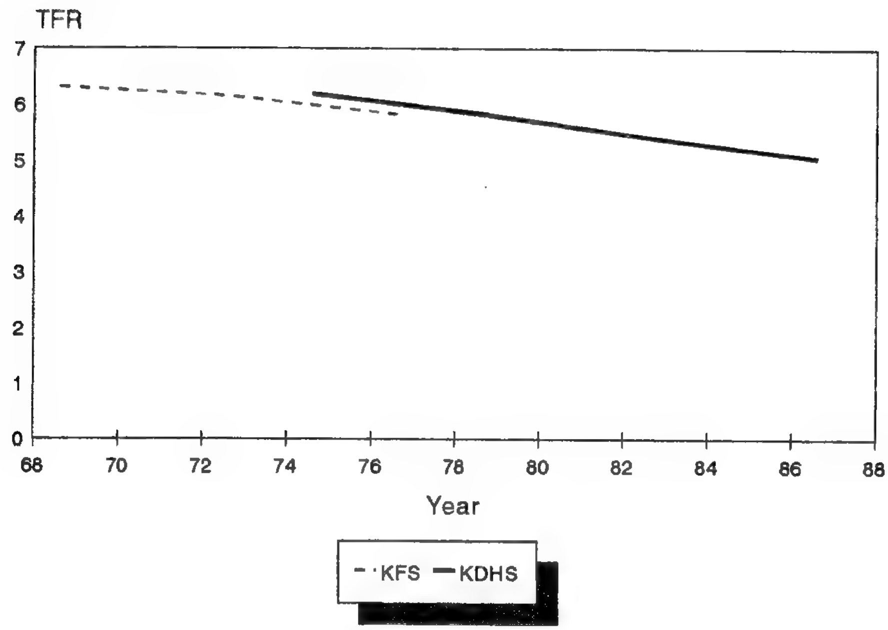
Table 4.1 Total fertility rates

Fertility rates by background characteristics for the four-year period preceding survey, women 15-49

Characteristic	1977-78 KFS	1989 KDHS	Percent Decline
Residence			
Urban	6.0	4.7	-21.7
Rural	8.4	7.0	-16.7
Education			
None	8.2	7.2	-12.2
1-4	9.0	7.6	-15.6
5-8	7.9	6.7	-15.2
9+	6.0	4.8	-20.0
Province			
Nairobi	5.8	4.5	-22.4
Central	8.5	5.8	-31.8
Coast	6.9	5.3	-23.2
Eastern	8.2	6.9	-15.9
Nyanza	8.2	7.1	-13.4
Rift Valley	8.8	7.1	-19.3
Western	8.1	7.8	-03.7
Total	8.2	6.6	-19.5

patterns would not necessarily have repercussions on fertility. This section discusses trends in marital patterns and explores the relationship between marriage and childbearing in Kenya.

Figure 4.1
Trends in the Total Fertility Rate
Women 15-34, 1977-1978 KFS and 1989 KDHS



Presented in Table 4.2 are the proportions of never-married[4] women by age for the 1977-1978 KFS and the 1989 KDHS. Like most of sub-Saharan Africa, marriage is a universal institution in Kenya. Revealed in Figure 4.2 is the proportion of never-married women falls steadily with age so that almost all Kenyan women have been married by age 30. In the 1989 KDHS, for example, the proportion of never-married women declines from 80 percent among 15–19-year-old women, to 32 percent among 20–24 year olds, 11 percent among the 25–29 age group, and to 3 percent among women 30 years and older (Table 4.2).

The data reveal a trend toward later marriage in the country. This is evidenced by increases in proportions never married, especially among the youngest women (Table 4.2 and Figure 4.2). The proportion of never-married women increased from 73 to 80 percent and from

[4] Marriage in this study is loosely defined to include all formal and informal unions.

21 to 31 percent among 15–19 and 20–24-year-old women, respectively. Table 4.2 suggests that the general trend toward later marriage was shared by almost all the population subgroups. However, the increase was more pronounced among groups that were more likely to marry young in 1977-1978 (women from the Coast Province and those who had no formal education).

The relatively high rates of change among the early marrying population subgroups have led to narrower differentials in 1989 than in 1977-1978. Table 4.2 shows that the proportions of never-married among teenagers were more closely related in 1989 than in 1977-1978. The same trend occurred among 20–24-year-old women, where the difference between the groups which had the highest and lowest proportions never-married declined from 41 to 35 percent over the decade.

Table 4.2 Women never married

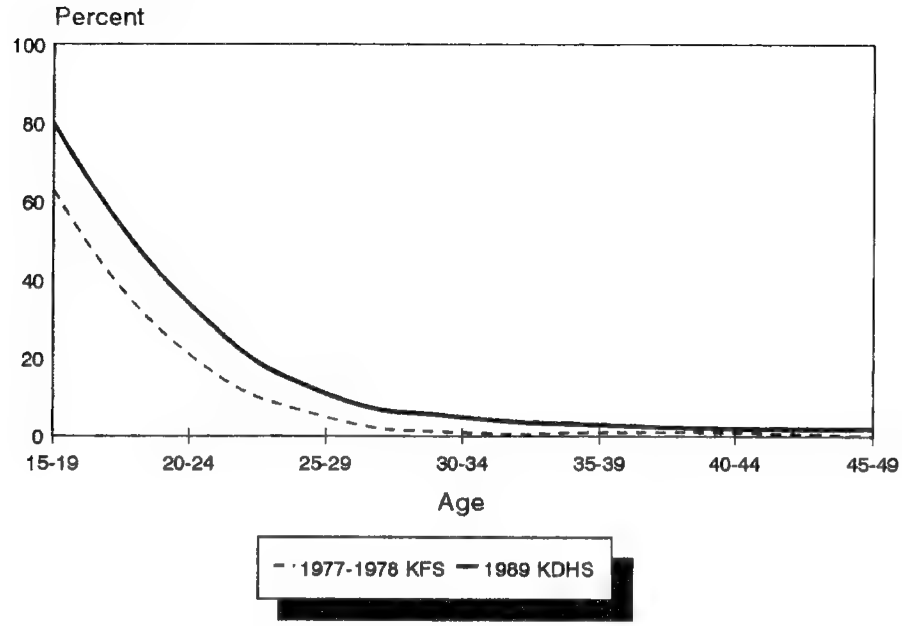
Percentage of women who have never married, according to background characteristics, 1977-78 KFS and 1989 KDHS

Characteristic	15-19 KFS	15-19 KDHS	20-24 KFS	20-24 KDHS	25-29 KFS	25-29 KDHS	30+ KFS	30+ KDHS
Residence								
Urban	66	70	29	34	7	16	4	9
Rural	74	82	19	31	4	9	1	4
Education								
None	39	59	8	11	3	5	1	2
1-4	71	63	12	14	1	3	1	3
5-8	79	80	20	29	6	11	2	4
9+	89	89	50	46	14	18	0	9
Province								
Nairobi	67	71	32	33	10	20	7	10
Central	87	89	31	46	6	19	1	4
Coast	46	70	11	29	3	4	0	4
Eastern	91	85	33	43	6	15	0	3
Nyanza	61	73	14	22	2	3	0	1
Rift Valley	70	80	20	30	5	10	2	5
Western	70	79	9	18	1	3	0	1
Total	73	80	21	32	5	11	1	3

Subgroup differentials in proportions never-married have narrowed over time but they have not been completely eliminated. Wide regional variations in proportions of never-married exist in both surveys. Teenage marriages are less prevalent in Eastern, Central, Rift Valley, and Western Provinces than in the Coast and Nyanza Provinces. It is not surprising that women from the Coast Province marry much sooner than women from the other regions because the Muslim culture, which is dominant in the region, encourages early and polygynous marriages.

Urban-rural differentials are also evident. The proportion of never-married teenage women is higher in rural than in urban areas. The relatively low proportion of never-married teenage women in urban areas and Nairobi is rather puzzling. A possible explanation for this phenomenon could be that the concept of marriage may not be as rigorous in the urban areas as it is in the rural areas. The most educated women marry much later than the least educated ones. Table 4.2 shows that the proportion of never-married women increases with years of education.

Figure 4.2
Percent of Women Never Married
at the Time of the Survey, KFS and KDHS



The delay in marriage is not accompanied by a corresponding delay in the onset of reproduction. Although the proportion of ever-married women has declined over time, the proportion of women who were either pregnant and/or had at least one birth at the time of the survey has remained fairly constant (Figure 4.3). Furthermore, the proportion of the women who were either pregnant, and/or had at least one birth at the time of survey is consistently higher than the proportion married at each age group (Table 4.3). This finding is consistent with others that show that childbearing is not confined to marriage in Kenya (Ferry and Page, 1984). This is not an unusual finding because couples in many sub-Saharan African countries may start having sexual relations several months before celebrating a formal marriage ceremony or starting to live together. Indeed, marriage may sometimes be conditional on proof of fecundity by women. Therefore, the age at first marriage cannot be used to estimate the time elapsed between puberty and first sexual union, nor that elapsed between first sexual union and first birth.

4.4 Postpartum Infecundability

Another major determinant of fertility is the duration of postpartum infecundability. This

is the duration immediately following childbirth during which a woman remains infecund until the normal pattern of ovulation and menstruation is restored. The duration of postpartum infecundability is influenced by the duration of breastfeeding and postpartum abstinence (Page and Lesthaeghe, 1981). Although its main function is the provision of nutrition to infants, breastfeeding also has an important effect on fertility because it delays the return of ovulation after each birth. In most African societies, the infertile period can also be prolonged by postpartum abstinence, especially if the abstinence interval exceeds the duration of breastfeeding. Preliminary analysis of the Kenyan data, however, suggests that breastfeeding is the main determinant of the duration of postpartum infecundability because it is generally longer than the duration of postpartum abstinence. This study will therefore focus on trends in breastfeeding durations.

Table 4.3 Marital and childbearing status

Based on background characteristics, KFS and KDHS of women

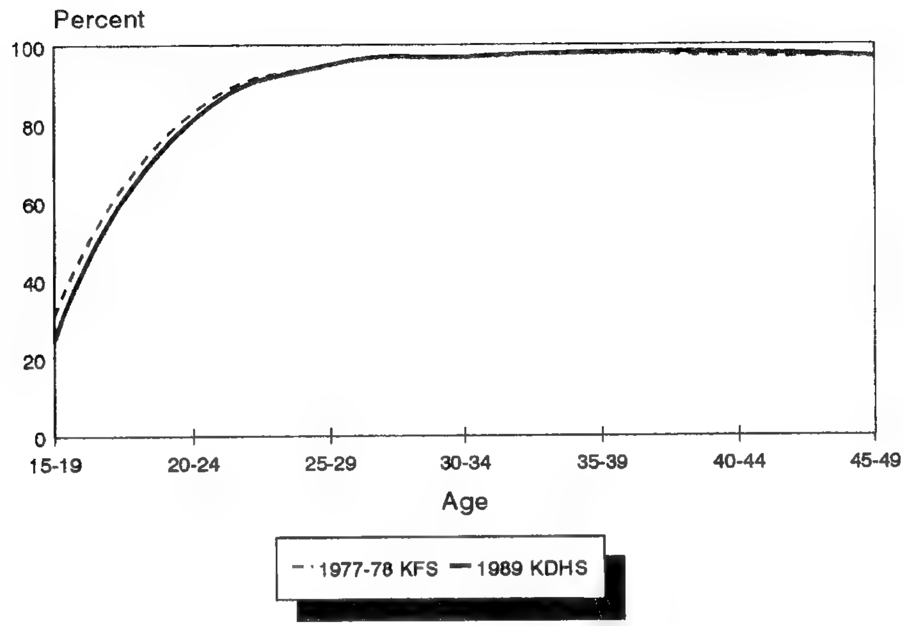
	Current Age							
	15-19				20-24			
	KFS		KDHS		KFS		KDHS	
Characteristic	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Residence								
Urban	34	35	30	29	71	77	66	74
Rural	26	30	18	25	81	85	69	84
Education								
None	61	58	41	38	92	88	89	91
1-4	29	28	37	47	88	89	86	90
5-8	21	26	20	26	80	87	71	87
9+	11	20	11	14	50	63	54	68
Province								
Nairobi	33	33	29	31	68	71	67	74
Central	13	20	11	22	69	78	54	77
Coast	54	42	30	19	89	89	71	73
Eastern	09	25	15	22	67	82	57	82
Nyanza	39	35	27	31	86	84	78	85
Rift Valley	30	36	20	25	80	85	70	83
Western	30	31	21	27	91	90	82	88
Total	27	31	21	25	79	83	68	81

Note: Columns 1, 3, 5 and 7 represent percentages ever-married. Columns 2, 4, 6 and 8 represent percentages who were pregnant and/or had a birth at the time of the survey.

The mean durations of breastfeeding are presented in Table 4.4 They reveal a slight increase in the duration of breastfeeding at the aggregate level--from 17.5 to 19.4 months between 1977-1978 and 1989. Close examination of the data also shows that this increase was shared by most population subgroups.

Unexpectedly, the increase was greatest among women in the "modern" subgroups (educated women, urban women, and residents of Nairobi and Central Provinces), who previously had the shortest breastfeeding durations (Table 4.4). For example, the mean breastfeeding duration increased by 22 percent among the most educated women, compared to only 11 percent among those who had no formal education. The same pattern is observed

Figure 4.3
Percent of Women with First Birth and/or Pregnancy at the Time of the Survey, KFS and KDHS



between rural and urban women. Because the increase was more pronounced among groups that had the shortest durations in 1977-1978, breastfeeding durations were more closely related among subgroups in 1989 than they were in 1977-1978. For example, there were larger interregional variations in breastfeeding in 1977-1978 (14-19 months) than in 1989 (18-20). Whereas Nairobi had the lowest duration for breastfeeding in 1977-1978, still lower rate for breastfeeding was recorded in Coast Province in 1989, where the mean duration of breastfeeding had declined by about 5 percent (Table 4.4). Further investigation of the Coast Province change should be undertaken. Also, the difference in the mean breastfeeding duration between rural and urban women declined from 3.6 months in 1977-1978 to 0.7 months in 1989.

Increase in duration of breastfeeding may be attributed to several factors: Kenya launched, in the last decade, a public health campaign to increase and encourage breastfeeding. (Studies of other developing countries with similar campaigns reported a positive impact [Sharma et al., 1990]). The government of Kenya, through the Ministry of Health, has enlisted radio, television, and newspapers to provide information about the benefits of breastfeeding. The major distributors of infant formula have also changed their promotional practices to conform to the World Health Organization (WHO) code which forbids them to teach infant feeding practices to new and expectant mothers and to distribute free infant formula packages. In

addition, hospitals have discontinued the practice of separating newborn children from their mothers. It is well established that the initial contact between mothers and their newborn babies enhances breastfeeding. Other efforts to promote breastfeeding include those by the Breastfeeding Information Groups (BIG) which have historically focussed on urban and educated women.

Table 4.4 Duration of breastfeeding

Mean duration of breastfeeding (in months) by background characteristics, 1977-78 and 1989

Characteristic	1977-78 KFS	1989 KDHS	Percent Change
Residence			
Urban	14.3	18.8	31.5
Rural	17.9	19.5	8.9
Education			
None	18.9	20.9	10.6
1-4	17.1	19.3	12.9
5-8	16.2	19.3	19.1
9+	14.5	17.7	22.1
Province			
Nairobi	14.0	19.9	42.1
Central	14.8	18.3	23.6
Coast	18.5	17.7	-4.3
Eastern	19.1	20.9	9.4
Nyanza	17.9	19.3	7.8
Rift Valley	17.6	19.2	9.1
Western	18.3	19.7	7.7
Total	17.5	19.4	10.9

Note: Estimates are based on births that occurred 1-36 months before the survey. Mean durations are calculated using the prevalence/ incidence method borrowed from epidemiology. The duration of breast-feeding is defined as the prevalence (number of children whose mothers are breastfeeding at the time of the survey), divided by the incidence (average number of births per month over the last 36 months).

The impact of breastfeeding on postpartum infecundability can be examined by comparing the mean durations of breastfeeding and postpartum infecundability (Tables 4.4 and 4.5). The data confirm that breastfeeding has an important impact on postpartum infecundability. Table 4.5 shows that the duration of postpartum infecundability changed in the same direction as that of breastfeeding. For example, the mean durations of breastfeeding and postpartum infecundability declined in Coast Province. Like changes in breastfeeding, the mean duration of postpartum infecundability increased for all the educational categories, although the major increase was observed among the more educated women. The same pattern occurred by place of residence; the reported durations of postpartum non-susceptibility increased much more in the urban areas than in the rural areas.

Differentials in the duration of postpartum infecundability also exhibit the same trend as the duration of breastfeeding. Non-educated women reported longer durations of postpartum infecundability than those who had some education (primary education and above).

Regional trends in postpartum infecundability showed a somewhat different picture from those observed in breastfeeding. For example, although Nairobi experienced one of the most significant changes in breastfeeding, change in the duration of postpartum non-susceptibility was not remarkable (13 percent change). This could be due to variations in the intensity and/or frequency of breastfeeding. Apart from Coast and Eastern Provinces, all the other regions

showed a positive change in postpartum non-susceptibility.

4.5 Contraceptive Use

Contraception is one of the major intermediate variables having a direct causal link to fertility (Bongaarts, 1978). Indeed, recent fertility declines observed in many developing countries have been partially attributed to increased use and effectiveness of contraception (DaVanzo and Haaga, 1982; Lapham and Mauldin, 1985).

Table 4.5 Duration of postpartum infecundability

Mean duration of postpartum infecundability (in months) by background characteristics, 1977-78 and 1989

Characteristic	1977-78 KFS	1989 KDHS	Percent change
Residence			
Urban	9.5	10.7	12.6
Rural	12.3	12.9	4.9
Education			
None	14.2	14.6	2.8
1-4	12.1	12.4	2.5
5-8	9.0	12.1	34.4
9+	8.3	10.5	26.5
Province			
Nairobi	9.7	11.0	13.4
Central	10.8	13.8	27.8
Coast	13.0	9.8	-24.6
Eastern	11.8	11.2	-5.1
Nyanza	12.5	12.9	3.2
Rift Valley	13.3	14.1	6.0
Western	11.0	12.0	9.1
Total	12.0	12.6	5.0

Note: Estimates are based on births that occurred 1-36 months before the survey. Mean durations are calculated using the prevalence/incidence method borrowed from epidemiology. The postpartum infecundable period is the period after birth during which the respondent was either amenorrheoic or abstaining.

Presented in Table 4.6 is the proportion of currently married women who were using contraception at each survey. Data in Table 4.6 reveals a large increase in use of contraceptive methods; the percent of currently married women using a method of contraception increased from 7 to 27 percent between 1977-1978 and 1989. The prevalence of modern methods (pill, IUD, injectables, condom, and sterilisation) increased substantially in the period between the two surveys. In 1977-1978, 4 percent of currently married women were protected by some modern contraceptive method, but the figure increased to 18 percent in 1989. Use of traditional methods (periodic abstinence, withdrawal, and other traditional methods) also increased—from 2 to 9 percent between 1977-1978 and 1989.

Like changes observed in breastfeeding and marital patterns, every subgroup studied in this report showed some gains in use of contraceptives, although the amount of change was not uniform. Furthermore, subgroups that had among the lowest contraceptive use rates in 1977-1978 (rural residents and women from Nyanza and the Rift Valley Provinces) made the most significant gains in modern method use over the decade.

There are subgroup differences at each survey period, but these have declined sharply. Education was highly correlated with contraceptive use in 1977-1978. However, contraceptive

prevalence rates have increased more rapidly among the least educated women—leading to less of a difference in the use of contraceptives in 1989 between those who have an education and those who do not. This comparison is based on differences between the 1977-1978 prevalence rate and the 1989 data. Strong regional differentials in contraceptive use are also evident. In 1977-1978, Nairobi had the highest use of modern contraceptive methods, but Central Province surpassed it in 1989. Nyanza, Rift Valley, and Western and Central Provinces, in that order, had higher gains in modern contraceptive use than the other regions. However, Nyanza and Western Provinces maintained the lowest levels of modern contraceptive use in both survey periods.

Table 4.6 Currently married women using contraception

Percentage of currently married women using contraception, Kenya, 1977-78 and 1989

	1977-78 KFS		1989 KDHS		Percent change	
Characteristic	Any method	Any modern method	Any method	Any modern method	Any method	Any modern method
Residence						
Urban	12.1	10.2	30.5	25.5	152	150
Rural	6.0	3.6	26.2	16.5	337	358
Education						
None	4.2	2.2	18.3	9.7	336	341
1-4	6.7	4.0	25.5	18.0	281	350
5-8	10.3	7.1	28.8	19.6	180	176
9+	17.1	14.9	41.7	30.4	144	104
Residence						
Nairobi	16.3	14.4	33.5	27.9	145	94
Central	10.5	7.6	39.5	30.8	106	305
Coast	4.6	3.9	18.1	14.8	293	279
Eastern	7.9	5.6	40.2	19.5	409	248
Nyanza	4.6	1.7	13.8	10.2	200	500
R.Valley	6.6	3.3	29.6	18.1	348	448
Western	3.4	2.4	13.7	10.0	303	317
Total	6.7	4.3	26.9	17.9	301	316

Note: Percentages are based on weighted data.

There are large differentials in the mix of methods used. Although the contribution of modern methods to total use increased only slightly at the national level (64 to 66 percent), the proportion of use that was attributed to modern methods increased much more significantly among some subgroups. In 1977-1978, modern methods accounted for over half of current use in all subgroups (except Nyanza Province). By 1989, however, the relative contribution of modern methods to total use had increased in all subgroups except in Eastern Province.

4.6 Sterility

Sterility is one of the major intermediate variables affecting fertility in sub-Saharan Africa (Frank, 1984). In parts of sub-Saharan Africa, 10 to 40 percent of married women remain permanently childless due to sterility. High prevalence of sterility has been reported in parts of Central Africa and the Sudan. The major causes of childlessness include venereal diseases and high incidence of foetal loss due to malaria and other diseases. The improvement of medical

facilities and the availability of better methods of treating sexually transmitted diseases have reduced sterility in many countries.

The data show that **primary** sterility is not a major fertility-reducing variable in Kenya (Table 4.7). The proportion of women remaining childless is very low except among urban women and women in Coast Province. It is also apparent that the prevalence of primary sterility has declined. Prevalence of **secondary** infertility (inability to have additional children) is more difficult to measure and is not considered here.

4.7 Decomposition of Change in Fertility

The preceding analysis suggests that changes in contraceptive use, breastfeeding, and possibly marriage may have contributed to fertility declines observed between 1977-1978 and 1989. However, the analysis cannot determine the relative importance of each variable to overall fertility levels and trends. The next section addresses this issue. It ties the previous findings into a single framework in order to assess the association between the intermediate fertility variables and the impact of each on fertility at each survey period, and to quantify the contribution made by each determinant to fertility change. Before proceeding with this discussion, it is useful to test the validity of the Bongaarts model by comparing the model (expected) and actual fertility rates.

Table 4.7 Childless women 40 years and older

Proportion childless among women 40 years and older by background characteristics, 1977-1978 and 1989

Characteristic	1977-1978 KFS	1989 KDHS
Residence		
Urban	0.02	0.05
Rural	0.03	0.02
Education		
None	0.03	0.03
1-4	0.01	0.02
5-8	*	0.01
9+	*	0.02
Province		
Nairobi	*	0.02
Central	0.01	0.02
Coast	0.06	0.03
Eastern	0.01	0.04
Nyanza	0.04	0.03
Rift Valley	0.01	0.02
Western	0.04	0.02
Total	0.03	0.02

*$p < .01$.

Examination of the ratios of the estimated over the actual TFRs reveals that the model fits well for all but urban residents, women who had more than 8 years of education, and those in Nairobi and Coast Provinces, who have considerably higher model TFRs than the observed rates (Table 4.8, Columns 13 and 14). There are several possible reasons for this phenomenon. One of the possible sources of bias could be measurement error in the proximate determinants. For example, it is plausible that sterility may be under-reported because childbearing is highly valued in Kenya. Furthermore, there are different modalities for women to raise children who are biologically not their own, and for such women, self-attribution of motherhood is perfectly acceptable.

The lack of data to measure the impact of the other proximate determinants could also

Table 4.8 Determinants of fertility

Proximate determinants of fertility by background characteristics, 1977-78 KFS and 1989 KDHS

Characteristic	TFR		Cm		Cc		Ci		Cp		TF		Est/Obv TFR	
	1977	1989	1977	1989	1977	1989	1977	1989	1977	1989	1977	1989	1977	1989
Residence														
Urban	6.0	4.7	0.86	0.82	0.89	0.72	0.71	0.69	0.94	0.97	11.7	11.9	1.30	1.29
Rural	8.4	7.0	0.95	0.88	0.95	0.79	0.65	0.64	1.00	1.00	14.3	15.7	1.07	0.97
Education														
None	8.2	7.3	0.99	0.96	0.97	0.86	0.61	0.60	0.99	1.00	14.1	14.7	1.08	1.04
1-4	9.0	7.6	0.99	0.97	0.95	0.78	0.65	0.65	1.00	1.00	14.7	15.5	1.04	0.99
5-8	7.9	6.7	0.93	0.88	0.91	0.76	0.73	0.65	0.95	1.00	13.5	15.4	1.15	0.99
9+	6.0	4.8	0.89	0.88	0.84	0.64	0.75	0.69	1.00	1.00	10.7	12.4	1.43	1.24
Province														
Nairobi	5.8	4.5	0.83	0.76	0.85	0.70	0.71	0.68	0.99	1.00	11.7	12.4	1.31	1.23
Central	8.5	5.8	0.95	0.83	0.91	0.65	0.68	0.62	1.00	1.00	14.5	17.3	1.06	0.88
Coast	6.9	5.3	0.95	0.82	0.96	0.84	0.63	0.71	0.94	0.99	12.8	10.9	1.20	1.40
Eastern	8.2	6.9	0.94	0.92	0.93	0.70	0.66	0.67	1.00	1.00	14.2	16.2	1.08	0.96
Nyanza	8.1	7.1	0.94	0.91	0.97	0.88	0.65	0.64	0.98	1.00	13.9	13.9	1.10	1.10
Rift Valley	8.8	7.0	0.96	0.88	0.95	0.76	0.63	0.61	1.00	1.00	15.3	17.2	1.00	0.89
Western	8.1	7.8	0.93	0.87	0.97	0.88	0.68	0.65	1.00	1.00	13.3	15.7	1.16	0.98
Total	8.2	6.6	0.94	0.87	0.95	0.78	0.66	0.64	1.00	1.00	13.9	9.4	1.10	1.00

Note: Estimated TFR = Cm x Cc x Ci x Cp x TF, assuming that TF = 15.3 for all groups.

bias the model estimates of the TFR. For example, this study assumes that induced abortion is absent because there is no abortion data. If this assumption is incorrect, an upward bias in the model estimates would be observed among groups that are most likely to practice abortion. Recent studies have shown that abortion is prevalent among urban and the most educated women in Kenya (Harbison and Robinson, 1990; Kalule-Sabiti, 1984). Kalule-Sabiti suggests that contraceptive use may be underreported by some population subgroups. This would also lead to an over-estimation of model TFRs.

The data in Table 4.8 indicate several interesting observations regarding the relative impact on fertility of the proximate determinants in Kenya. The important role of postpartum infecundability (and hence, breastfeeding) as an inhibitor of fertility is clearly evident; in 1977-1978 and 1989, postpartum infecundability was the most important inhibitor of fertility. It is also important to note that the impact of postpartum infecundability on fertility has remained constant over the study period.

Contraceptive use did not have any appreciable effect on fertility in 1977-1978, but it became relatively important in 1989. Moreover, the contraceptive index (Cc) underwent the most significant change over the decade—from 0.95 in 1977-1978 to 0.78 in 1989. The relative importance of marital patterns (or total exposure to childbearing) has also changed. In 1977-1978, marriage was the second most important fertility-inhibiting variable but its importance was surpassed by contraceptive use in 1989. Sterility (Cp) does not suppress fertility at the aggregate level (value of 1.00), but its effect is important in the urban areas, in the Coast Province, and

among women who had 5 to 8 years of education. In all cases, however, the fertility-reducing impact of sterility has declined. This is consistent with declines in the incidence of sterility during the same period.

An interesting association between the indices of contraception (Cc) and postpartum infecundability (Ci) is observed (Table 4.8). The index of contraception is low (strong suppressing effect on fertility) when the index of postpartum infecundability is high (lower fertility suppressing effect). The pattern observed among the educated groups is very illustrative. It is obvious that contraceptive use tends to replace the effect of postpartum infecundability among the most educated women. This finding is consistent with studies carried out elsewhere (Bongaarts and Potter, 1983).

Table 4.9 summarises the contribution made by each proximate determinant to fertility change. It reveals that contraceptive use is the most important determinant of the fertility decline, explaining 62 percent (-17.9 / (-7.4 + -17.9 + -3.3 + -0.3)) of the aggregate fertility decline. What is even more important is that contraceptive use accounted for the largest proportion of the decline across all subgroups. The contribution of contraceptive use was very significant in the urban areas; especially among women who had the highest levels of schooling; and in Central, Coast, Rift Valley, and Coast Provinces.

The changing proportion of women who were exposed to the risk of childbearing (Pm) is the second most important determinant of fertility decline. Change in marital patterns accounted for 26 percent of the fertility decline. This variable was particularly important among women in the Coast and Central Provinces. It is important to note that the impact of this variable on fertility decline would have been greater than the actual rate if exposure to the risk of childbearing had only been confined to marriage.

Although postpartum infecundability is the most important determinant of fertility in Kenya, it did not contribute significantly to the fertility decline (see Tables 4.8 and 4.9) because the effect of the variable changed only slightly. However, changes in postpartum infecundability would have increased fertility in the Coast Province had the proximate determinants remained constant. This is not surprising because durations of breastfeeding and postpartum infecundability also declined in this region over the study period.

Table 4.9 reveals that fertility change in Kenya cannot be fully explained by the proximate determinants of marriage, postpartum infecundability, and contraceptive use. It demonstrates that the influence of sterility and "other" (Pr) proximate determinants (frequency of intercourse, types of marital unions, and separation of spouses, the incidence of intrauterine mortality) would have increased fertility had the other determinants remained constant. These variables are extremely important even among the subgroups that experienced fertility declines. This finding suggests that more work on other biological determinants of fertility is needed in

Table 4.9 Total fertility rates

Components of change in total fertility rates, 1977-78 KFS and 1989 KDHS

Character-istic	Pf	Pm	Pc	Pi	Pp	Pr	I
Residence							
Urban	-21.7	-4.7	-19.1	-2.8	+3.2	1.7	0.0
Rural	-16.7	-7.4	-16.8	-1.5	0.0	9.8	-0.8
Education							
None	-12.2	-3.0	-11.3	-1.6	+1.0	4.3	-1.6
1-4	-15.6	-2.0	-17.8	0.0	0.0	5.4	-1.2
5-8	-15.2	-5.4	-16.5	-11.0	5.3	14.1	-1.7
9+	-20.0	-1.1	-23.8	-8.0	0.0	1.2	-11.7
Province							
Nairobi	-22.4	-8.4	-17.6	-4.2	+1.0	6.0	0.8
Central	-31.8	-12.6	-28.6	-8.8	0.0	19.3	-1.1
Coast	-23.2	-13.7	-12.5	+12.7	+5.3	- 14.8	-0.2
Eastern	-15.9	-2.1	-24.7	+1.5	+1.0	14.1	-5.7
Nyanza	-13.4	-3.2	-9.3	-1.5	+2.0	0.0	-1.4
Rift Valley	-19.3	-8.3	-20.0	-3.2	0.0	12.4	-3.2
Western	-3.7	-6.5	-9.3	-4.4	0.0	18.0	14.6
Total	-19.5	-7.4	-17.9	-3.3	0.0	9.4	-0.3

Pf = ((TFR2/TFR1) -1) * 100 = Pm + Pc + Pi + Pp + Pr + I = percent of change in TFR.

Pm = ((Cm89/Cm77) -1) * 100 = percent of change in TFR that is due to change in marital patterns.
Pc = (Cc89/Cc77) -1) * 100 = percent of change in TFR due to change in contraception.
Pi = (Ci89/Ci77) -1) * 100 = percent of change in TFR due to change in postpartum infecundability.
Pp = (Cp89/Cp77) -1) * 100 = percent of change in TFR due to change in sterility.
Pr = (TF89/TF77) -1) * 100 = percent of change in TFR due to change in the remaining proximate determinants.
I = Pf - (Pm + Pc + Pi + Pp + Pr) = the interaction factor.

order to understand current and probably future fertility trends in Kenya. The "other" proximate determinants could also be capturing errors in measurement of the observed total fertility rates and proximate determinants employed in this analysis. It is possible that better measurement (of fertility rates and proximate determinants) in subsequent surveys may reduce the importance of the "other" determinants.

5 SUMMARY OF FINDINGS

A substantial fertility decline occurred in Kenya between 1977-1978 and 1989. The decline was shared across all population subgroups, although the magnitude of the decline differed greatly. The largest declines in fertility occurred in Nairobi and Central, Coast, and Rift Valley Provinces. The objective of this project was to study the determinants of this fertility change.

The study examined trends in the proximate determinants of fertility. It showed that Kenyan women are delaying marriage much more than they did in the past. The proportion of never-married women increased over the study period, especially among the youngest women. The delay in marriage has not, however, been accompanied by a similar delay in the onset of reproduction. This is because the exposure to the risk of childbearing is not confined to marriage in Kenya.

The mean durations of breastfeeding increased substantially between 1977-1978 and 1989. Moreover, the mean duration of breastfeeding increased among all subgroups except in the Coast Province. The increase in breastfeeding has been attributed to the breastfeeding campaigns conducted by the Breastfeeding Information Groups (BIGs) and to changes in hospital practices.

Between 1977-1978 and 1989, a dramatic increase in contraceptive use occurred in Kenya: contraceptive use among currently married women increased from 7 percent in 1977-1978 to 27 percent in 1989 KDHS. Levels of sterility are very low in the country although it is higher in the urban areas and the Coast Province.

The important role of postpartum infecundability as a fertility inhibiting variable in Kenya was confirmed in this study. In 1977-1978 and 1989, postpartum infecundability was the most important fertility suppressing variable. Contraceptive use did not have any appreciable effect in 1977-1978, but its impact increased significantly over the study period. The effect of marriage was more important in 1977-1978 than in 1989.

Summarised in the study is the contribution of each proximate determinant to fertility change in Kenya. The analysis revealed that contraceptive use was the most important determinant of aggregate fertility decline. Moreover, contraceptive use accounted for the largest proportion of fertility decline across all subgroups studied in this report. Change in marital patterns was also important. Although postpartum infecundability is the most important determinant of fertility in Kenya, it did not contribute much to the fertility decline because its importance in inhibiting fertility remained almost unchanged.

Various policy implications can be drawn from these findings. The results of the study have demonstrated the important role of contraceptive use in promoting fertility decline. Increased efforts to provide effective contraceptive methods, especially in areas where contraceptive use rates are low, such as Nyanza and Western and Coast Provinces, should lead to further fertility declines. The findings clearly show that fertility declines in Kenya can be

accelerated more by focussing on changing the timing of first birth than the age at first marriage. This can be achieved by providing education beyond primary school and by making contraceptive methods accessible to unmarried teenage women. The efforts to increase breastfeeding are commendable. However, there should be similar campaigns to increase the intensity of breastfeeding. The study also points toward many areas of further research. For example, it is important to study why breastfeeding durations are declining in the Coast Province but increasing elsewhere. Research on the social context of fertility decline would complement the findings discussed in this report.

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